SPECIES ASSOCIATION INCREASES BIOFILM RESISTANCE TO CHEMICAL AND MECHANICAL TREATMENTS

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The study of biofilm ecology and ethology might help to improve our understanding of their resistance to control strategies. Recent concerns that the biofilm community diversity can affect disinfection efficacy has led us to examine the effect of the association in a dual species biofilm of two industrial endemic bacteria (*Bacillus cereus* and *Pseudomonas fluorescens*) on their behavior to antimicrobial and mechanical treatments.

Single and dual *B.cereus* and *P.fluorescens* biofilms were formed in an innovative bioreactor rotating system at a constant shear stress force. Steady-state biofilms were exposed to independent treatments with cetyl trimethylammonium bromide (CTAB) and glutaraldehyde (GTA) solutions, followed by increasing shear stress.

Biofilms bacteria were organized in a stratified, layered, structure each with differential tolerance to chemical and mechanical stress. Dual and *P.fluorescens* biofilms had both the highest resistance to removal when pre-treated with CTAB and GTA, respectively. *B.cereus* biofilms were the most affected by hydrodynamic disturbance and the most susceptible to antimicrobials. Dual biofilms were more resistant to antimicrobials than each single species biofilm. The species association increased the proportion of viable cells of both bacteria and enhanced shear stress stability.

Dual biofilms were more resistant and stable than the respective single biofilms. This synergistic species association, in addition to other well described biofilm-specific antimicrobial-resistant phenotypes could at least partly explain the survival of multispecies biofilm cells in adverse environments. The molecular expression of multi-drug resistance resulting from species association is being investigated.